ملخص

المساحة

إعداد : أميمة نصّار

اللجنة الأكاديمية للهندسة المدنية

تلخيص

مساحة

أميمة نصّار

Contact us :

$$\boxed{\text{Accuray ratio} = \frac{\text{error}}{\text{True value}}}$$

Ex: measured distance = 250.56
, actual = 250.5 ?

Solution :-

$$\text{Accuray} = \left| \frac{250.56 - 250.5}{250.5} \right|$$

$$= \frac{0.06}{250.5} = \frac{1}{471.5} = \frac{1}{4200}$$

① علماً بصورة $\dfrac{1}{\Box}$

② يجب أن نقترب بأرقام لبقرب منها (100) LL أضلع لنتائج

Ex: if the measured internal
angels in atriangle are :-

180° مجوع

71° 12' 13"
55° 34' 27"   Find the error of
53° 56' 37"   closure and the accura
                     ratio in the measuremen

Solution:

① مجموع الزوايا الي قسناها

$$
\begin{array}{llll}
71° & 12' & 13'' & \\
55° & 34' & 27'' & \oplus \\
53° & 56' & 37'' & \\
\hline
180° & 43' & 17'' &
\end{array}
$$

② مجموع زوايا المثلث

$$180° \quad 00' \quad 00''$$

③

$$
\begin{array}{lll}
180° & 43' & 17'' \\
180° & 00' & 00'' \quad \ominus \\
\hline
00° & 43' & 17''
\end{array}
$$

④

$$Accuray = \frac{00° \quad 43' \quad 17''}{180° \quad 00' \quad 00''} = \frac{4*10^{-3}}{\#}$$

علي ألة النسبة ولكننا نرمز أحوله إلى أكسر عادي

⑤ $4*10^{-3} = \dfrac{1}{X}$ $\boxed{X = 250}$

Accurcy ratio $= \dfrac{1}{250}$

Ex: if the station of acertain positio
in (2+36.72) and stations are taken
each (100m) the distane of the positior
from the base point is :-

Solution:

① $2 + 36.72 \longrightarrow$ every $100m$

$(2*100) + 36.72 = 236.72$

② if the position $164 + 45$ and the station is every $(75m)$

Solution:

$(164 * 75) + 45 = 12345$

③ Find the station at distance $(12345)m$ if the station taken every $(75)m$ ∴

Solution:

$\dfrac{12345}{75} = 164.6 \Rightarrow 164 + 0.6$

④ if station as certin point is $237 + 024.32$ and station are taken each $(1 km)$ Find the distance $\underset{10^3}{\downarrow}$ from base point?
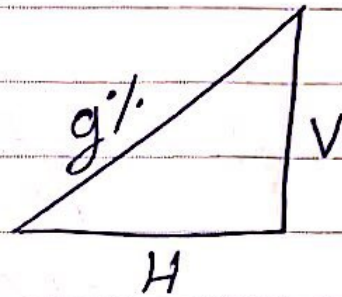
$237 * 1000 + 024.32 = 237024.32$

Slope correction

Zenith angle $(Z) = 40° - \theta$

Gradiant (rate of grde)

$(g\%) = (V/H) * 100\%$

Example

Given Station $A = 2 + 25$, elevation of point $A = 228.32m$

Station $B = 7 + 32$, AB graident $= -2.5\%$

Find elevation if point (B)

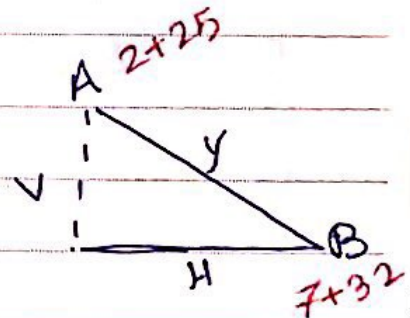## Solution

$H = 732 - 225 = 507m$

$g\% = \dfrac{V}{H}\%$

$-2.5 = \dfrac{V}{507} * 100 \qquad V = -12.68m$

elevation of $B = 228.32 - 12.68 = 215.64\,m$

Example

Given Station of point $A = 5 + 275$

elevation of point $A = 375.85\ m$

Station of point $B = 23 + 0145$
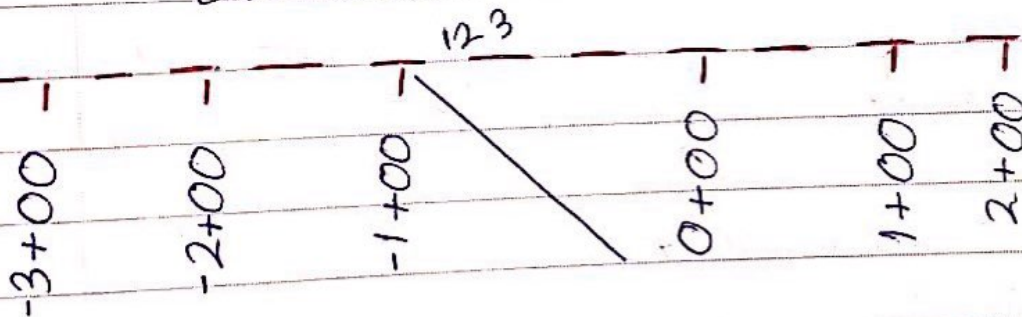
elevation of point $B = 123.67m$

Find Graidaen of Line AB ?

Solution

$H = 23045 - 5275 = 17770$

$V = 375.85 - 123.67 = 252.18m$ → خطأ لازم يطلع بالسالب

ضل ميل 1% تقريباً

$V = 123.67 - 375.45$

$= -252.18m$

$g\% = \dfrac{-252.19}{17770} * 100$

$= -1.419\%$

⑤ Given station of point A in two different Metheel

                    123

-3+00   -2+00   -1+00   0+00   1+00   2+00

|___2

* بنبلشن من اليمين إلى اليسار $0 + (-7)$

* بنبلشن من اليسار إلى اليمين $-1 + (3)$

* Slope and horizantal distance

slopedistance = 52m

sloped distance = 100m

slope distance = 100m

slope = 100

sloped distance = 100

$47°33$ $17°48$ $35°27$ $22°13$

smile

Find the horizantal distance

$\Sigma(H = 5\cos\theta)$ على قانون $\cos$
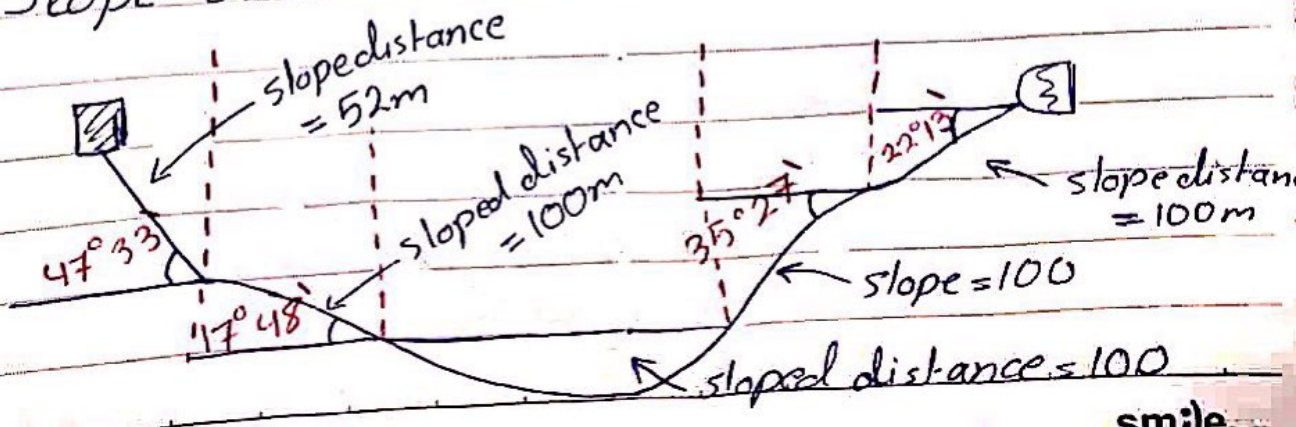
$H = (100\cos(22°13')) + (100\cos(35°27')) + (100 + (100\cos(17°48'))) + (52 + \cos(47°33'))$

$H = 404.348\ m$
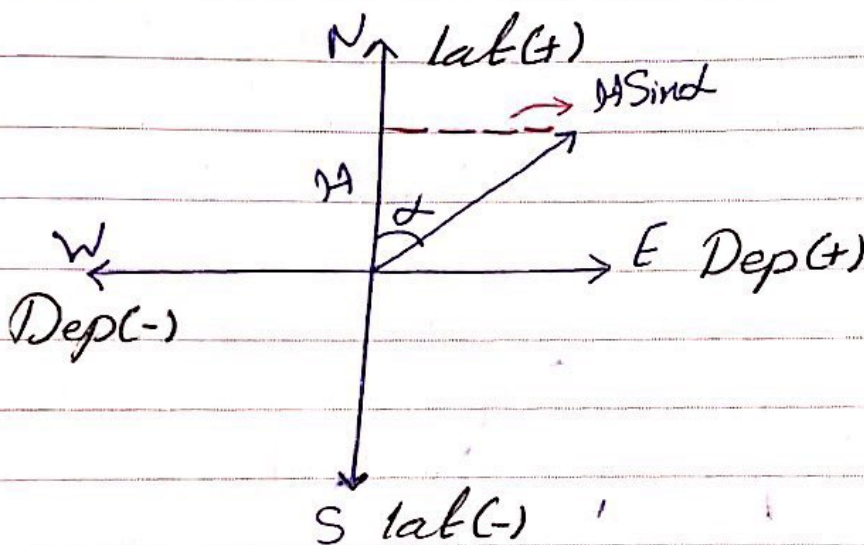
$\alpha = Azimoth$

خاصي داعي أدخل بالاشارات بنظرع كالها
إذا إستعست Bering لازم أمز البتي

$latitud\ \Delta y = H\cos\alpha$
$Departur\ \Delta x = H\sin\alpha$

Single traverse, Departur latitud ايجاد

ملاحظة : في مجموع latitude تساوي (Zero
في مجموع Departur تساوي (Zero

line	length →H	Az	Beaming	lat. $H\cos\alpha$	Dep $H\sin\alpha$
1	9.299	62° 49'	N 62°49' E	4.24	8.27
2	7.91	133° 6°	S 46°54' E	-5.404	5.776
3	9.57	240° 40°	S 60°40' E	-4.693	-8.34
4	9.818	294° 27°	N 65°33' W	4.06	-8.938

$$H\sin\alpha = 5.776$$

$$H = \frac{5.776}{\sin 133°6°} = 7.91$$

$$H\cos\alpha = -4.693$$

$$H = \frac{-4.693}{\cos 240°40°} = 9.57$$

$$H = \frac{-8.938}{\sin 294°27°} = 9.818$$

Closed traverse
sign for lat and Dep.

-De
-lat
+De

smile
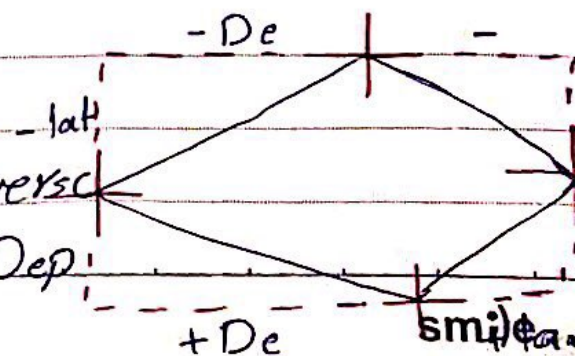
Balancing Angles

① $180(5-2) \stackrel{?}{=} \Sigma \not{x}$

$540° \ 00' \ 00'' = 539 \ 57°$

$\ominus \ 539° \ 57' \ 00'$

=

$00° \ 03' \ 00''$ ← قيمة مجموع الفرق بين الزاوية الأكبر

نوزع الأكبر للمتساوي ، الزاوية الأكبر تأخذ كمية أكبر
، يتم التصحيح على الزاوية نفسها

By wight ①
By equally ②

① By wight

Point	Angle value	Correction	Corrected Angl
A	$78° \ 49'$	$\left(\dfrac{78°49'}{540°} * 03'\right) = 0.000 \ 26$	$78° \ 49' \ 26'$
B	$142° \ 49'$	$0.0' \ 47.61'' = 0.0048''$	$142° \ 49' \ 48'$
C	$139° \ 01'$	$0° \ 0' \ 46''$	$139° \ 01° \ 46''$
D	$75° \ 37'$	$0° \ 0' \ 25''$	$75° \ 37' \ 25''$
E	$103° \ 41'$	$0° \ 0' \ 35''$	$103° \ 41' \ 35''$
Total	$539° \ 57'$	$0° \ 3' \ 0''$	$540° \ 0' \ 0''$

نقوم بالزوايا أعلى

② By equally

$$\frac{03'}{5} = 0° 0' 36''$$

تنجه لكل زاوية

① $78° 49° + 0° 0 86'' =$
   $78° 49' 36''$
② $142° 49' 36''$
③ $139° 01' 36''$
④ $75° 37' 36''$
⑤ $103° 41' 36''$
   $540° 0' 0''$ لتأكد إحجم

تصحيح

Temperature Correction :-
① Standard temp for steel tape
                              $68°F$ or $20C$

② Thermal coefficient of expansion for steel
tape
   $(0.0000064 S/L) \Rightarrow F°$
          or $\Bigg] \Rightarrow \alpha$
   $(0.0000116 /L) \Rightarrow C°$

③ Correction due to Teme

$$C_t = a * (T - T_s) * L$$

Ct = tempreture correction

a = Thermal coefficient

T = Tempreture of tabe

T_s = Stander temberature ← إذا ما أعطاني إياها

L = total distance measured   أنا بفرضها 20e or 68F°

بالعادة ما يحكيلي أنا بعرف كابي ← lag out

Ex: Given distance to lag out = 210.08m

used tape 30m (seen) Tape temperature will be 27C° find corrected length to be lag out

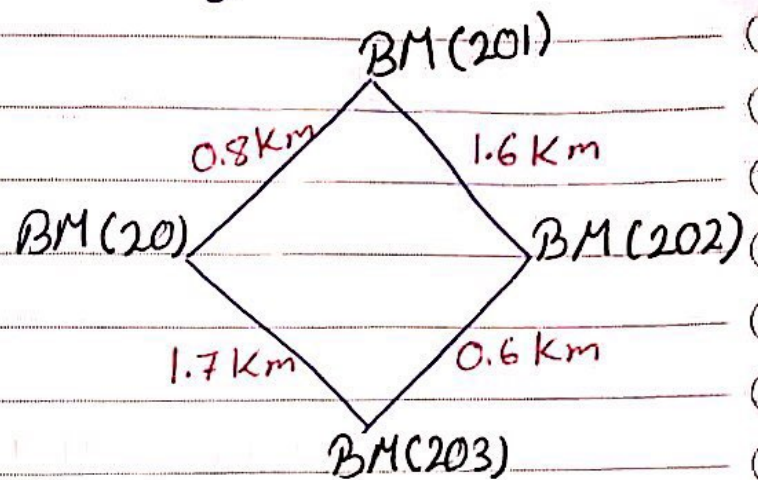أي خطأ بال tube بس حكي عنه الحرارة خل على القانونة مباشرة

Solution

$$C_t = a * (T - T_s) * L$$
$$= 0.0000116 (27 - 20) * 210.08$$
$$= 0.017$$

lag out قصة حوله

* Correcord distance to be lay out
$$= 210.08 - 0.017$$
$$= 210.063 \, m$$

BM (201)

0.8 Km   1.6 Km

BM (20)   BM (202)

1.7 Km   0.6 Km

BM (203)

$$\dfrac{\text{Comulative distance} \times \text{error}}{\text{total distance}}$$

BM	comulative distance	elevation	correction (+)	Corrected value
20	0	186.273	0	186.273
201	0.8	18.242	0.003	184.245
202	2.4	182.297	0.008	182.305
203	3	184.227	0.0010	184.237
20	4.7	186.258	0.015	186.271

Corrected value = elevation ⊕ Correction

Error الاشارة مطلع مخلف إشارة

$$-0.015 \rightarrow \oplus$$

distrubutzl error = last error - first error
$$= -0.015$$

Allawable error $= 0.008\sqrt{K}$
$$= 0.008\sqrt{4.7}$$
$$= 0.0173$$

$$10.0151 < 0.0173$$
it ok

عند اقارنة أي اذ اقل من المطلوبة

- Distributed error = last elevation - first elevation

Allowable error $= 0.008\sqrt{K} \rightarrow Km$

$$D.E > A.E \qquad \text{Not ok} \qquad \text{repat your work}$$
$$D.E < A.E \qquad \text{its ok} \qquad \text{in the field}$$

Trigonometric leveling

Theodolite $\rightarrow$ measard angelas and elevation

* There cases, for the target point
position =

① Target point highter that Theoditic

Rod Reading (RR)

mease slope distance

hit I

Ele A

hi

Elev B

$$V = S \sin\alpha$$
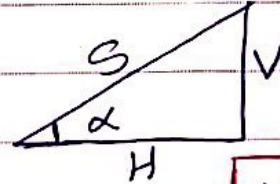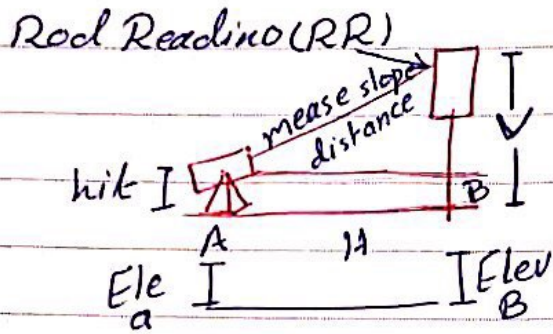
$$Elev._B = Elev._A + hi + V - RR$$

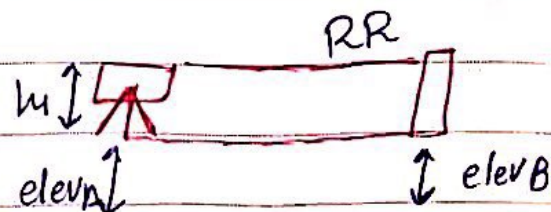② Target point is lower ther Theoditic

H

hiI

A

ElvA

V

(RR)

B

ElvB

$$V = S \sin\alpha$$
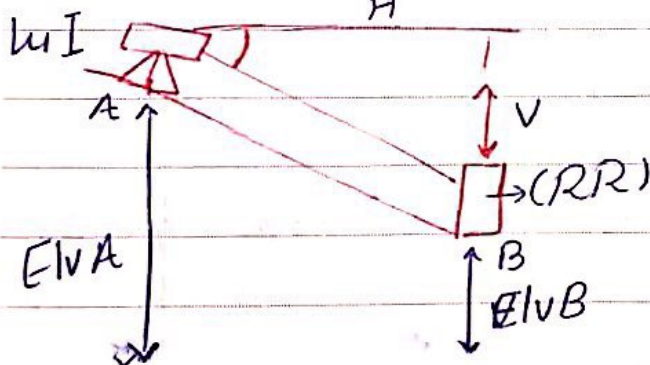
$$Elev._B = Elev._A + hi - V - RR$$

③ Targe point is the some level B of the Theaditic
($\alpha = 0.00$)

$$V = S \sin\alpha = 0$$

hi

RR

elevA

elevB

$$Elev._B = Elev._A + hi - RR$$

Example

measured distance = 42.071m , used tape 100m
Mass of the used part of the tape = 1.63kg
Applied tension force = 100N , Tape is not
fully supported fined corrected measured
distance

Solution

$$C_s = \frac{W^2 L}{24 P^2} = \frac{-(1.63*9.807)^2 * 42.071}{24*100^2}$$

$$= -0.0447$$

Total correction = -0.0447 * 1 = -0.0447

Corrected measured distance = 42.071 - 0.0447

$$= 412.026$$

ممكن يجي سؤال فيه كل الأخطاء موجودها ← وقتع حسب كل وحده

يجمع

Corrected mursed distance = distance + [Total correction = Slope + Temp + Sag + Tension

كيف ببي أعرف إذا في عندي log out بالطول ولا لاءه؟!

معناها زيادة في الطول

[log out] في القياس

① في حالة Tapelough correction

Actual > seen ⟶ log out يوجب

Seen > Actual ⟶ log out طبعاً

② في حالة Tcompruter correction

Temp > 20C ⟶ logout يوجد

Temp < 20C ⟶ logout لا يوجد

③ في حالة ال Tension

Tension > 50 ⟶ log out لا يوجد

Tension < 50 ⟶ log out يوجد

④ في حالة ال sugging

الإشارة دائماً سالبة وحالي يعني log out

* Tension and Say correction ::

$$C_p = \frac{(P - P_2)}{AE} \quad \rightarrow \quad \text{rabe}$$

$$C_s = \frac{-W^2 L^3}{24 P^2} = \frac{-W^2 L}{24 P^2}$$

القانون 2

(−) label l قول sugging نقي إذا إنة لـ ...

(W) weight of tape per unit lengt

(W) weight of tape

القانون 1

$C_p \rightarrow$ tention correction per tape lengt

$P \rightarrow$ Applied Tension 9.81 لتحويل للنيوتن

$P_s \rightarrow$ Standerd Tension (4.5-5 kg (50N))

$L \rightarrow$ length of tape under consideration

$A \rightarrow$ tape - cross sectional area

$E \rightarrow$ Avarge Medulos of elasticily of steel tapes

$$(21E5 \ kg/sq \ cm)$$

$$21 * 200 * 5 * 10^2 * 9.807$$

$Say = zero \leftarrow$ fully support إذا كان ذو الارتكازات إذا كان ذو الارتكازات *

Ex: Given measured distance = 182.716 used tape 30m tape cross sectional area = 0.02 sq.cm , standard tention force = 50N used tension force = 100N , Find corrected measured distance

Solution

$$C_p = \frac{(P-P_2)*L}{AE} = \frac{(100-50)*30}{0.02*21*200\ 5*10^2*9.807}$$

$$= 0.003621$$

$$\text{Total correction} = \left(\frac{182.716}{30}\right) \times 0.00364 = 0.022\,m$$

Corrected measured distance = 182.716 + 0.022 = 182.738m

BS	FS	HI	elev	Remark	Distance	Correction (−)	Corve elev
2.868		164.141	161.273	A(BM)	0	$\frac{0}{843} \times 0.0006$ $= 0$	161.
1.977	0.982	165.136	163.159	JP#1	420	$\frac{420}{843} \times 0.006$ $= 0.0029$	163.1
	0.540	164.596	164.596	B(BM)	843	0.006	164.5

must be equal

For cheack = ΣBS − ΣFS $\overset{\uparrow}{=}$ last elev − First elev

$$(4.845 - 1.522) \overset{?}{=} (164.596 - 161.273)$$
$$3.323 \overset{?}{=} 3.323$$

Error = Elev.B − True value
= 164.596 − 164.590
= 0.006 ⟶ $0.08\sqrt{K}$

حطة المسافة اكبر 843 وال
0.843 = Km يعني K

$$= 0.08\sqrt{0.843}$$
$$= 0.0072\,m$$

Compeper

إقل حذا, مسموح لذا انعمل على توزيعه

smi)e for life

$$\boxed{Correction = \frac{Distence\ from\ start\ point}{total\ Distance}}$$

Corrected elevation = elevation $\ominus$ correction

0.006

B ⊢420⊣ A

⊢ 843 ⊣

رقم كل نقطة تؤخذ قراءة وقت اخري
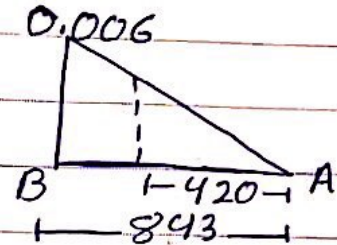
BS (m)	FS (m)	HI (m)	Elev (m)	Distance (m)	Correction ⊖ (m)	Corrected elev	Remak
0.225		49.746	49.512	0	0	49.521	BM #512
0.445	1.995	48.196	47.751	46	0.0003 مع تقريب	47.7.507	P₁
1.253	2.415	47.034	45.781	78	0.004	45.777	P₂
2.425	1.265	48.203	45.778	104	0.006	45.772	Point A
2.324	0.533	49.994	47.67	128	0.007	47.663	P₃
	0.473		49.521	160	0.009	49.512	BM #512

Actual

الأحداثيات القراءة. البدئ

closing level

(Closing leveling) smile for me
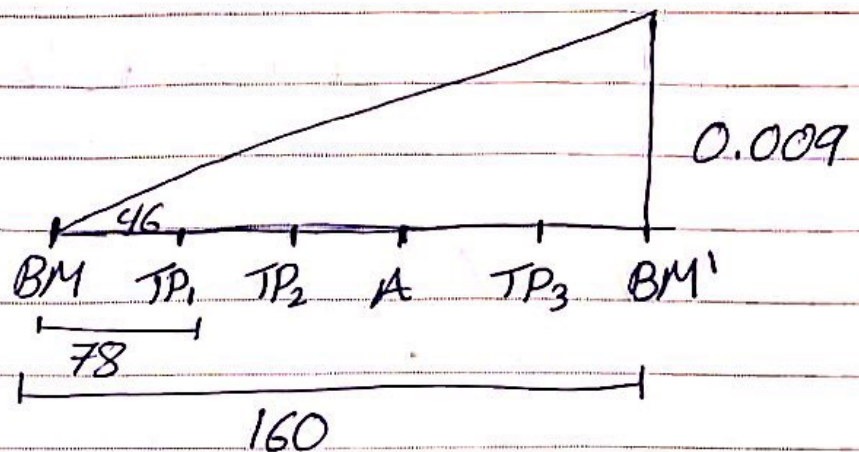
$$\Sigma BS - \Sigma FS = last - First$$
$$6.672 - 6.681 = 49.512 - 49.521$$
$$-0.009 = -0.009$$

$$Error = measured - Acutal$$
$$= 49.512 - 49.521$$
$$= -0.009$$

* Tape length Correction

① Correction per tape length = Actual − Seen
                            length   length

② Number of used tape = $\dfrac{distance\ measured}{Length\ of\ tape}$ → ②

③ Total Correcation = (Correction) * (Number) → ③

④ Corrected measured = measured + total
     distance   distance   Correction

Seen > Actual   تقصير tape

Corrected measured = measured + total
        distance   distance   correction

$$\underline{Actual > Seen}$$
                  $\downarrow$
      تطويل tape
  log يزيد
  out

Given measured distance = 171.278 used
tabe = 30m (3eem), Actual length = 29.996
Final corrected length
① Correction per unit length = -0.004
② Nurtin = $\dfrac{171.278}{30}$ = 5.709

③ total corration = -0.004 * 5.709 = -0.023
④ Corratd = 171.278 + (-0.023) = 171.255

Distance to log out = 210.08   Actrul > Seen
length tape 30 m (seen), Actuall length = 30.006 m
Find corrected length to be laid out

① 30.006 - 30 = 0.006

② $\frac{210.08}{30}$ = 7.003

③ 7.003 * 0.006 = 0.042

④ 210.08 - 0.042 = 210.038 m

BS.FS نأخذها بعض
منازل

IS → لعامله وقع
بتنزلسته

Tension
Sag   → كل سؤال بيجي
Tem

① تسبب كل خطأ كله الك ,لقانونه
Cp , CJ   ليباعت احيان,
corrected = distance + $\frac{(خطأ)}{①}$ + $\frac{(خطأ)}{②}$

Closed level → تنتهي نقطة مع منى١٩/ارتفاع

① إذا استهى (B.M) أو نقطة لبيها لظروف, ارتفاع,
نقطة
أخرى تكون

Latitudes range from ___0___ to ___180___ ,
extced East to West

Long tude range from __0__ to __360__
extend from North to south

slope angle

$H = S\cos\theta$
$V = S\sin\theta$

2.00   1.00   50   0+00   100m
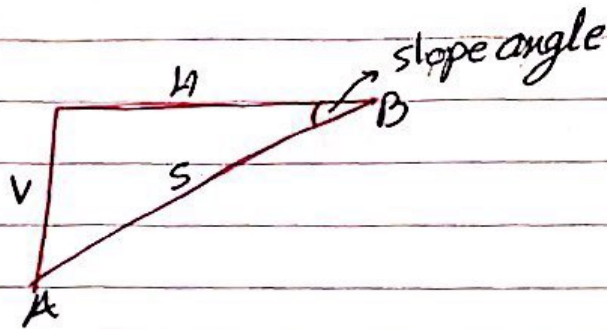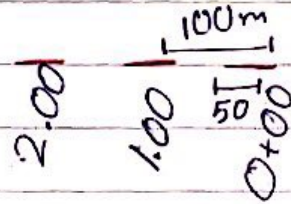
* Substense Bar
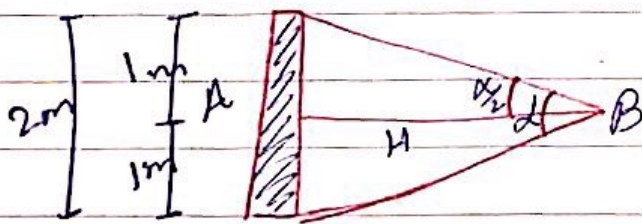
$\tan\left(\dfrac{\alpha}{2}\right) = \dfrac{1}{AB}$

Distance $AB = \dfrac{1}{\tan\left(\frac{\alpha}{2}\right)}$

$$\boxed{\text{Distance } AB = \cot\left(\dfrac{\alpha}{2}\right)}$$

* Accuracy ratio = $\dfrac{error}{True\ value}$

measued distance = 250.56
Actual = 250.56

175 = 200 عند قيمة معينة ٢ ② $\dfrac{1}{\boxed{}}$ ①

Find accuring ration ?١

① $\dfrac{|Actual - measured|}{Actual}$

$$\dfrac{|250.50 - 250.56|}{250.56}$$

$$= \dfrac{1}{4,175} = \dfrac{1}{4200}$$

$$\dfrac{1}{5000} \quad , \quad \dfrac{1}{6000} \quad , \quad \dfrac{1}{10000} \qquad \dfrac{1}{4175} = \dfrac{1}{4200}$$

نأخذ اقرب قيمة ←

$$4*10^{-3} = \dfrac{1}{X} \qquad X = 250$$

offest
distance

Steel tape حديدة
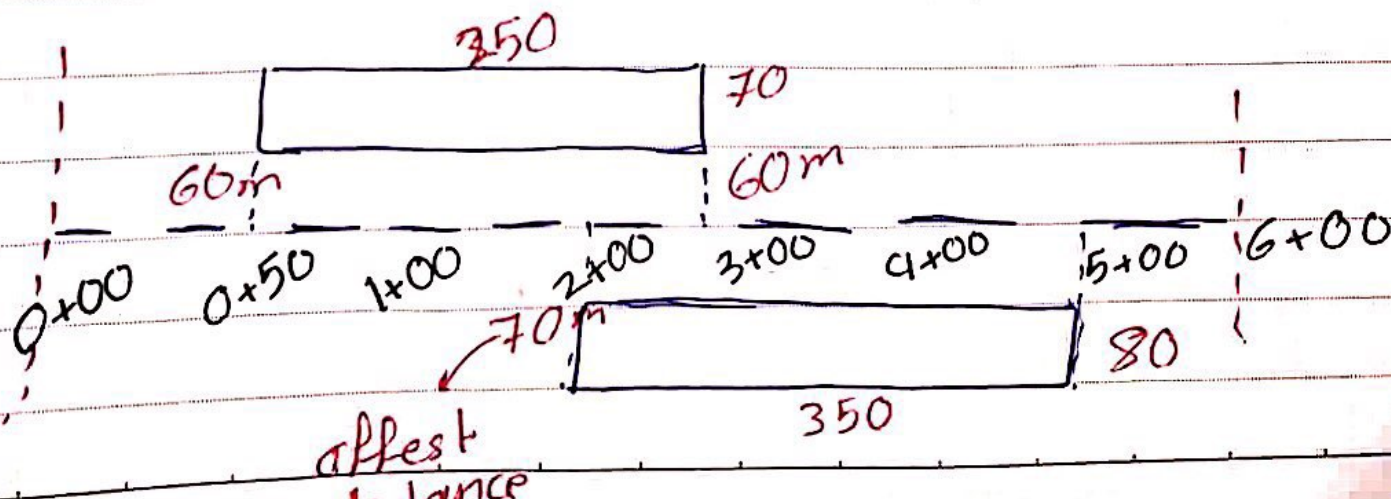
① Temp = 20°c   ② 50N   ③ No Sag (fully supported)

⊛ Add tape

```
            |  |  | |  |   |   |  //  |   |        ↓ 13.45
           0.5 0.3 0.1 0   1   2   11  12  13
```

⊛ Cut tape

```
        |  |  |  |  |  |   |  //  |   |   |      ↓ 12.55
       0.3 0.5 0.7 0.9 1   2      11 12  13
```
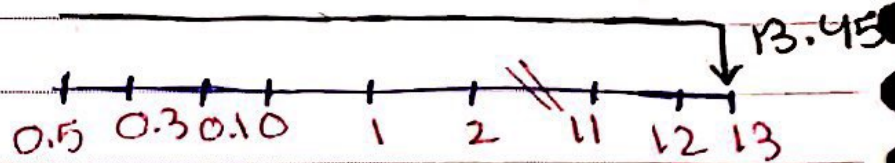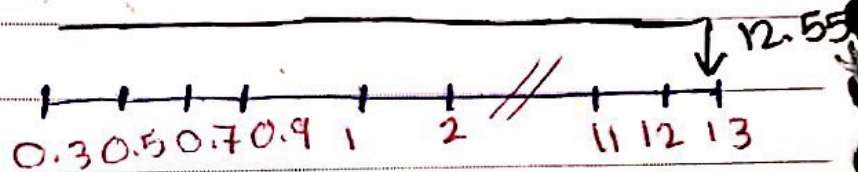
Slope correction
① Slope angle (θ)
② Zenith angle (90−θ)
③ Vertical distance
④ grading (g%) $= \dfrac{V}{H} * 100$ ↗

إذا طلب g
لازم يرسم احداثه
وإشارة %

g%
S
V
H

❦ Best Wish ❧